ON MAMMALS FROM SIAM.

By F. N. Chasen.

Most of the specimens in the large collection of mammals from Siam deposited in the Raffles Museum, Singapore, have been noticed in a series of papers published by Mr. C. Boden Kloss. The majority of the papers appeared in this journal between 1915 and 1920. There remain, however, many skins obtained from various sources, which have never been studied in detail.

Most important among these is much unstudied material from Peninsular and S. W. Siam: also the mammals obtained by an expedition which collected along the Mekong River on the Siam-French Indo-China boundary. These specialized, carefully made collections merit detailed reports and for this and other reasons are not included in the present paper which concerns itself only with miscellaneous skins mostly accumulated during the past decade. Much of the material was obtained from Mr. C. J. Aagaard, but Messrs. H. G. Deignan, Rudolphe Meyer de Schauensee, Dr. Malcolm Smith, and Sir W. J. F. Williamson also kindly contributed specimens all of which are acknowledged below over the collector's initials. In the case of Mr. Aagaard, his initials also cover specimens obtained by his native collectors.

I have made no attempt to describe this large collection in detail, but have worked through it with the papers published by Kloss and the collections on which these were based, merely recording specimens and facts when they seem to add something to our knowledge of Siamese mammals. Many of the skins did not merit notice in a paper of this kind being well-known species from equally well-known localities.

The specimens considered below come from the following localities which I have arranged in the zoo-geographical divisions proposed by Kloss.[1]

Northern Siam. *Chiengmai*, and near that town at an altitude of about 1000 feet. The mountain, *Doi Sutep* (5,600 feet) west

[1] *Vide* Proc. Zool. Soc., 1916, p. 64; Journ. Nat. Hist. Soc. Siam, 1, 1915, p. 250 and map; op. cit., 2, 1917, p. 288; op. cit., 3, 1919, p. 336.

of Chiengmai. The mountain, *Doi Angka* or *Doi Intanon* (8,400 feet) south-west of Doi Sutep.

Central Siam. *Bangkok* and its environs. Tachin, west of Bangkok. *Paknampo* at the junction of the Me Nam and Me Ping Rivers.

Eastern Siam. *Korat. Pak Jong*, between Saraburi and Korat.

South-east Siam. *Nong Khor* near *Sriracha* on the eastern side of the Inner Gulf of Siam. *Chantabun.* The hill *Khao Sebap* near Chantabun. *Klong Yai*, south of Krat.

Peninsular Siam. From north to south, *Bandon*; *Nakon Sritamarat*; *Bangnara.*

Hylobates lar pileatus Gray.

1 ♂, 1 ♀, Nong Khor near Sriracha, S. E. Siam (*C. J. A.*); 2 ♂, Klong Yai, south of Krat, S. E. Siam (*C. J. A.*); 1 ♀, without exact locality.

The first pair listed above are the most westerly known examples of the subspecies and are, I expect, the animals referred to by Kloss in Proc. Zool. Soc., 1929, p. 118.

Two of the males are black with the cap well isolated; in one, the white facial ring is complete and broad; in the other, the lower half of the ring is only indicated by a very narrow fringe of whitish hairs. The third male is also mainly black, but the back is greyish and the cap reduced to a relatively small patch in a sullied white area; the white facial ring is complete. The genital tuft is white in all the males. Both the females are creamy in general colour, but blackish from throat to lower abdomen. One has an isolated black cap, but in the other there is a complete black facial ring linking the cap to the black of the under parts.

A juvenile male is uniformly dirty white.

Although, as is well known, colour cannot be correlated with sex in *H. l. lar*, it seems that in the present subspecies adult males are always in the "dark phase" and adult females in the "pale phase".

Pocock has hinted that *pileatus* is perhaps a somewhat smaller race than *lar*. The following table of basal lengths in millimetres is compiled mostly from fully adult skulls in the Raffles Museum, but a few published measurements are added from Lyon (Sumatra) and Kloss (Siam):—

H. l. albimanus	♂ 69.3–75.6 (5);	♀ 71.7
H. l. lar	♂ 66.4 (1); 71.3–82.5 (10);	♀ 65.9–76.1 (5)
H. l. entelloides	♂ 69–79 (12);	♀ 68.5–78 (9)
H. l. pileatus	♂ 69–76 (8);	♀ 69.2–71 (4)

On these series it will be seen that the two geographically isolated subspecies, *albimanus* and *pileatus*, do not attain the same maximum size as the others but the differences are very small.

We still have very little precise knowledge about the ranges of the various forms of *Hylobates* found in Siam, and from the eastern part of the country, where perhaps three forms meet, there is no information at all. de Pousargues has recorded *lar* (= *H. l. entelloides*) from Luang Prabang in western Laos, but where this form, which is common through the western part of Siam as far north as Doi Par Sakeng in the north of the kingdom, meets *H. l. pileatus* which occurs in S. E. Siam is unknown. At Pak Lay on the Mekong in French Laos *H. concolor leucogenys* is found.

Hylobates lar pileatus.

Locality	Sex	Greatest length	Basal length	Zygomatic breadth	Upper tooth-row excluding incisors (alveoli)
Klong Yai, S. E. Siam	♂	104.2	73.7	70	32.2
„	♂	105.5	76	73.5	32.7
nr. Sriracha, S. E. Siam	♂	97.5	70.6	67.4	29.6
„	♀	97.4	69.2 +	66	28.8
? locality	♀	105.6	71	66.2	30.8

Pygathrix obscurus flavicauda (Elliot).

1 ♂, Nakon Sritamarat (*C. J. A.*); 2 ♀, Bandon, Peninsular Siam (*C. J. A.*).

Pygathrix obscurus > halonifer (Cantor).

5 ♂, 3 ♀, Bangnara, Peninsular Siam.

I have before me about ninety well prepared skins of *Pygathrix obscurus* from various places on the mainland of Asia between Koh Lak in S. W. Siam, and Johore in the extreme south of the Malay Peninsula, and from various small islands off both coasts of the Peninsula. As the species in the restricted sense does not seem to occur much further north than Petchaburi and is also not found on Singapore Island the available specimens almost cover the known geographic range.

Surveying the series arranged according to localities from north to south in one line I think few systematists would cavil at the recognition of the three mainland races already suggested, but although these are, typically, sufficiently distinct to merit recognition, the limits of the areas they occupy are not easy to define.

This monkey is more stable in any one locality than many mammals, but the variation follows the latitude very evenly and there is the usual difficulty in grouping the skins about the type localities.

As Kloss has already discussed and described in detail a number of the specimens in his various papers and has also given a broad appreciation of the several subspecies, I will here only attempt to fill in some details of the outline he has sketched.

In the south of the Malay Peninsula animals from Johore, Malacca, Negri Sembilan, Selangor and Pahang certainly cannot be separated racially. Specimens from the more northern localities of the Dindings, Perak, Perlis, Trengganu, and Bangnara in Patani are also very similar, but in these places there is a tendency to duskiness and animals with comparatively dark hind limbs turn up more commonly than in the south. The distinction is, perhaps, more marked on the western than on the eastern side of the Peninsula, but the differences are very fine and not, I think, of racial value.

About the distinction of the darker race inhabiting Penang Island, *P. o. halonifer*, there can be no question and in series *halonifer* stands out well although the palest example from Penang can be matched by the darkest skin from Perak. The animals inhabiting the northern Malay States are *P. obscurus* > *halonifer* for they cannot be placed with *halonifer* and neither are they worth a special name.

On the islands of Terutau and Langkawi in the Straits of Malacca there is the yet darker race *P. o. carbo*, and in colour there is thus a perfect gradation, the species darkening as it ranges northwards from about Lat. 1° 20′ N. to about 6° 40′ N. where, as far as the Peninsula is concerned, it reaches its maximum intensity.[1]

From approximately this point the variation takes a different course for whereas the back continues to become darker, the limbs become paler as the animal ranges northwards.

In Siam two races have to be considered. *P. o. smithi* from Patiyu in S. W. Siam is very pale on the limbs with the dark feet sharply contrasted. *P. o. flavicauda* was applied to an animal from Trang in Peninsular Siam: topotypes are so much darker on the limbs than *smithi*, especially on the arms, that typically the two races cannot be confused.

On the balance of characters animals from various islands off the west coast of Siam as far north as Koh Yam Yai, must be placed under *flavicauda* although some skins from Pulau Panjang are so precisely intermediate that they defy exact allocation. A number of specimens from Ghirbi, Nakon Sritamarat, and Bandon are also intermediate but I think the average is nearer to *flavicauda* than to *smithi*. At Chumporn animals occur referable to both races and it therefore seems reasonable to regard the Isthmus of Kra as the approximate boundary between the ranges of the two subspecies.

Pygathrix obscurus.—*Summary of colour characters in the Malayan and Siamese subspecies.*

[1] The darkest animal I have seen is from the island of Terutau, but on the series available I should not care to separate animals from that island and its neighbour, Langkawi.

P. o. obscurus (Reid).

Back purplish brown : limbs greyish tinged with brown ; the black feet sharply contrasted on the legs, less so on the arms.

Distr.—Johore, Malacca, Negri Sembilan, Selangor, Pahang.

P. obscurus > halonifer (Cantor).

On series slightly darker than *P. o. obscurus.*

Distr.—The Dindings, Perak (specimens from some localities in South Perak are perhaps best placed with *obscurus*), Kedah, Perlis, Trengganu ; and Patani at least as far north as Bangnara.

P. obscurus halonifer (Cantor).

Much darker than **P. o. obscurus** *and the contrast between body, limbs and feet therefore less marked.*

Distr.—Penang Island.

P. obscurus styx (Kloss).

Very dark on the back ; perhaps nearest to **P. o. halonifer** *but tail and limbs paler.*

Distr.—Perhentian Islands, east coast Malay Peninsula.

P. obscurus carbo (Thos. and Wrought.).

The darkest and therefore most concolorous race.[1]

Distr.—Islands of Terutau and Langkawi.

P. obscurus flavicauda (Elliot).

Very dark on the back ; limbs greyish or greyish brown with dark contrasting feet on the hind limbs as in **P. o. obscurus** : *limbs paler than in* **styx.**

Distr.—From Trang in Peninsular Siam, north to the Isthmus of Kra.

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[1] I have not seen *P. o. sanctorum* (Elliot) from St. Matthews Island, Mergui Archipelago. There is an isolated unnamed dark form of this species on Koh Pennan off the east coast of Peninsular Siam. It is certainly not *styx*, but so very near to *halonifer* and *carbo* that, on the material, I do not care to describe it. On the upper parts it is as dark as Terutau specimens of *carbo* although the frontal band is less black, but the limbs are most like those of *halonifer.*

P. obscurus smithi (Kloss).

Back very dark. Limbs paler than in **P. o. flavicauda** *with the feet on both fore and hind limbs strongly contrasted.*

Distr.—Siam from the Isthmus of Kra, north to Petchaburi.

Pygathrix obscurus argenteus (Kloss).

Although *Pithecus crepusculus*[1] has recently been used to cover all the grey leaf-monkeys over a wide range from Upper Tenasserim to French Indo-China this is certainly too wide a view as Osgood[2] realized when he wrote.—"If regarded as a linear series, running from dark colour to light the group is found to have *barbei* at one extreme and *argenteus* at the other, leaving *phayrei*, *shanicus* and *crepusculus* as more or less definite stages between the two."

Robinson and Kloss[3] and Osgood agree that the type of *P. wroughtoni* from "Pachebon" (= Petchabun or Petchaburi in Central Siam and not the place of that name south of Bangkok) is darker than *argenteus* and both Pocock and Osgood place *wroughtoni* in the synonomy of *crepusculus* the type locality of which is Mount Muleyit in Central Tenasserim. Siam is therefore inhabited by two clearly allied subspecies. In the Raffles Museum the darker form, *P. o. crepusculus*, is represented by specimens from the Me Ping Rapids in N. Siam; a point on the Mekong between Xien Khan and Vien Chan on the boundary between Siam and South French Laos; and from west of Raheng whence the form ranges to Petchaburi. Of the paler, more silvery form, there are specimens from near Raheng; Paknampo; and the type locality, Lat Bua Kao about thirty miles west of Korat in E. Siam.

[This paper was sent to press before I had seen Mr. Pocock's paper on langurs in P.Z.S., 1935, p. 895.].

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[1] Vide Pocock, Journ. Bomb. Nat. Hist. Soc., xxxii, 1928, p. 672, and Thomas, P. Z. S., 1928, p. 832.

[2] Field Mus. Nat. Hist., Zool. Ser., xviii, 1932, p. 202.

[3] Ann. Mag. Nat. Hist., (8) xiii, 1914, p. 397 ("practically identical with specimens of *P. obscurus* from the Patani coast.").

Macaca nemestrina indochinensis Kloss.

Macaca nemestrina indochinensis Kloss, Journ. Nat. Hist. Soc. Siam, 3, 1919, p. 343 (Lat Bua Kao, E. Siam).

2 ♂ subad., Chantabun, S. E. Siam (*C. J. A.*).

From the Kingdom of Siam I have thirteen skins of this macaque. The two from Chantabun agree with two skins from Saigon and S. Annam, and with Kloss' descriptien of *indochinensis*, in being duller than *M. n. adusta* although there is one young male of the latter from Ghirbi in Peninsular Siam which I should not care to separate from the eastern series.

Mr. Pocock [1] has recently put forward the view that *adusta* (type locality, S. Tenasserim) and *indochinensis* are inseparable from *andamanensis* (type locality, somewhere in Burma). I have been unable to compare *andamanensis*, but on the material before me, I certainly think *indochinensis* is worth recognition as distinct from *adusta*. The specimens mentioned by Mr. Pocock from "Klong Tundai, Tongha" and "Selok Poh in Panjang" are from Klong Tung Sai in the island of Tonka also known as Tongkah, Puket, Salanga, or Junk Seylon) and Telok Poh in Pulau (= island) Panjang, both off the *west* coast of Peninsular Siam. The skins are, of course, referable to *adusta* (? *andamanensis*).

A skin from Pak Jong, E. Siam, is described as being intermediate in tint between specimens from Klong Menao, S. E. Siam and Tonka. This is to be expected as the locality is intermediate, but Kloss seemed to think that the specimen was nearer to his *indochinensis* than to *adusta*.

Macaca mulatta mulatta Zimmermann.

Macaca siamica Kloss, Journ. Nat. Hist. Soc. Siam, 2, 1917, p. 247 (Me Ping rapids below Chiengmai, N. Siam).

1 ♀, near Chiengmai, N. Siam (*H. G. D.*).

Although he has seen no Siamese specimens Mr. R. I. Pocock[2] considers that over a wide range, from Nepal to Tonkin, the Rhesus

[1] Journ. Bomb. Nat. Hist. Soc., XXXV, 1932, p. 297.

[2] Journ. Bomb. Nat. Hist. Soc., XXXV, 1932, p. 530.

Macaque is indivisible into geographical races. Dr. Osgood[1], independently, also refers animals from French Indo-China to the typical form, and it seems impossible to disagree with the contention of these authors that the Siamese form has yet to be proved separable.

This macaque is found as far south as Prome and Toungoo in Lower Burma but, according to Pocock, not in Tenasserim. In Siam it seems only to occur in the north. I have seen skins from Chiengmai; from the Mekong on the Siam-French Laos boundary; and from a point a few miles north of Raheng. This latter locality seems to be the known southern limit for the species for in French Indo-China it is recorded only as far south as Vientiane on the Mekong in Laos.

Nycticebus coucang cinereus M.-Eds.

1 ♀, Chantabun, S. E. Siam (*C. J. A.*).

A fine adult, very white on the forelimbs and head, and the hind limbs also largely creamy.

Skull:—greatest length, 63.3; zygomatic breadth 44; maxillary tooth-row exclusive of incisors (alveoli) 23.7; least distance between ridges on cranium, 5.3 mm.

Felis bengalensis bengalensis Kerr.

1 ♀, Doi Sutep, N. Siam, 5,500 feet (*C. J. A.*); 1 ♂, 1 ♀, Pak Jong, E. Siam (*C. J. A.*); 1 ♀, Klong Yai, S. E. Siam (*C. J. A.*).

The Klong Yai specimen is one of the dullest examples of this species I have seen from the continent. The Doi Sutep skin is very pale and bright. The Pak Jong animals are comparatively dull.

Viverra zibetha ? surdaster Thos.

Viverra zibetha surdaster Thomas, Proc. Zool. Soc., 1927, p. 46 (Xieng Khouang, Laos).

1 ♀, Chiengmai, N. Siam, 12th March 1931 (*C. J. A.*).

This specimen is mostly in the winter coat with a very

[1] Field Mus. Nat. Hist., XVIII, 1932, p. 208.

indistinct pattern of tawny markings on the hinder part of the body. The coat is much thicker and longer than in more southern specimens of *V. z. pruinosa* taken in the same month at Tenasserim Town. The bullae are comparatively small.

I have eight skins of this species before me from the southern part of the Malay Peninsula and have, at various times, seen a number of others in taxidermists' shops in Singapore. Fresh Malayan skins are almost invariably grey with a blackish pattern, but occasionally there is a slight buff wash: old skins, especially if fatty or stuffed with tow, are often suffused with yellow, all over.

In the Malay States there is no marked seasonal change of pelage and, as in the other local mammals, the coat is always sleek and thin, the species exhibiting little, if any, seasonal variation in colour except that due to wear.

The Malayan form has been named *V. z. sigillata* Rob. & Kl., and while it is likely that it resembles a stage passed through during the year by the more northern subspecies *pruinosa*, the distinctness of the latter form in its winter coat precludes all possibility of the two subspecies being confused, and I think *sigillata* must be allowed to stand although Mr. R. I. Pocock[1] has recently considered it inseparable from *pruinosa*.

Viverra megaspila Blyth.

1 ♀ flat skin; 2 kittens, Bangkok, C. Siam (*W. J. F. W.*).

1 ♀, Doi Angka (*C. J. A.*).

The family was taken on 30th August 1923. On a label the collector has written:—

> "With 2 kittens out of a litter of 5. The parent was killed by the men who found the family in scrub jungle in Sathorn Road, Bangkok."

The kittens are much blackened and very unlike adults, the ground colour being dark grey. The ground colour of the Bangkok adult is buff, that of the Doi Angka skin quite grey without any yellowish tinge.

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[1] Journ. Bomb. Nat. Hist. Soc., xxxvi, 1933, p. 434.

Viverricula malaccensis malaccensis (Gmel.).

2 ♂, 1 ♀, Bangnara (*C. J. A.*).

Viverricula malaccensis thai Kloss.

Viverricula malaccensis thai Kloss, Journ. Nat. Hist. Soc. Siam, 3, 1919, p. 352 (Prapatom, Central Siam).

Viverricula indica thai, Pocock, Journ. Bomb. Nat. Hist. Soc., xxxvi, 1933, p. 650.

1 ♀, Nong Khor, near Sriracha, S. E. Siam (*C. J. A.*); 1 ♂, 1 ♀, Pak Jong, E. Siam (*C. J. A.*).

Mr. Pocock has recently set aside the old established name *malaccensis* on the grounds that the description and figure given by Sonnerat, on which Gmelin's name was based, are indeterminable, but I cannot subscribe to this action for it seems to me that whatever subsequent French authors had to say the description and figure of "La Civette de Malacca" are quite recognizable as being those of the present species.

That the description and plate are not accurate in every detail cannot be disputed, but in all the broad characters the former is as accurate as many others of its period and it cannot be taken to apply to any other Malayan civet.[1] An important point is that it obviously applies to a lateral aspect of the animal, and remembering this, it is clear that the reference to three black bands on the neck includes the two dark bands across the throat. Similarly, it can quite reasonably be said that there are three dark stripes along the loins, for ventral to these well-defined lines, the area is spotted: in the figure the distinction between stripes and spots is rather exaggerated. In some skins the blackened under parts do present the appearance of a broad black longitudinal band and the legs and feet are black. Furthermore, one of three skins from the Malay Peninsula is greyer and less ochraceous than the others and the body pattern is black

[1] Omitting some other considerations, the number of the rings on the long tail excludes *V. zibetha*, and the fact that the rings are complete, *Z. megaspila* and *Z. tangalunga*.

rather than brown: in another specimen the top of the head is slightly blackened.

Sonnerat's figure shows a specimen with ten dark rings on the tail: I have one which, seen from the side, shows nine rings clearly and there is room for a tenth. In another skin the anterior dark throat band is only faintly indicated. The posterior dark band is sometimes irregular and much broken up, and seen from the side presents the appearance of a second lateral neck stripe although not so clearly defined as in the figure which is slightly diagrammatic.

Pocock accepts *thai* for "Siam, Indo-China and possibly Burma" regarding it as a duller race than the form occurring in the Malay Peninsula, and apparently lower Burma, also averaging rather larger than *malaccensis* and with the bullae a trifle further apart. At the moment of writing I have before me five examples of this civet from Perak and Peninsular Siam representing *malaccensis*, and four skins of *thai*, three listed above and a paratype of the subspecies from Prapatom about thirty miles west of Bangkok. The colour distinction between the two forms as exhibited between these series is extremely fine, but set for set the northern animals are a trifle paler in their ground colour with the dark markings, especially on the tail, browner and less black.

On the other hand the cranial characters ascribed to *thai* by Kloss are confirmed by the new specimens and the relatively slight convergence of the bullae and wider basioccipital of the northern race form excellent and immediate points of distinction between the two series of skulls before me. The skulls of my *thai* also average slightly larger than those of *malaccensis*. Considering that *V. malaccensis* (Gm.) is untenable Pocock has named the Malayan form *V. indica klossi*, but an earlier name, *V. m. atchinensis* Sody[1], based on animals from North Sumatra needs consideration for Malayan and Sumatran animals are possibly alike: there is, at least, nothing in

[1] Natuurkundig Tijdschrift voor Nederlandsch Indie, Deel xcl, 1931, p. 351.

the original description of *atchinensis* to warrant the recognition of a Sumatran subspecies.

Measurements of adult *Viverricula* skulls.

Locality	Sex	Greatest length	Condylobasal length	Upper tooth-row excluding incisors (alveoli)	Zygomatic breadth	Greatest breadth across bullae	Least breadth between bullae anteriorly
V. m. malaccensis							
Bangnara	♂	102	99.4	36	45.3	30.9	7.2
„	♂	96.7	94.9	36.2	43.7	30.5	6.3
Perak	♀	97	96.1	35.2	47	30	7.3
V. m. thai							
Pak Jong, E. Siam	♂	105	102	39.2	49.5	31.5	9.3
„ „	♀	101.5	99.8	37.2	47	31	8.6
Prapatom, C. Siam	♀	98.5	94	35	46	31	8.3

Paradoxurus hermaphroditus laotum Gyld.

Paradoxurus hermaphroditus laotum Gyldenstolpe, Kungl. Sv. Vet. Akad. Handl. 57, 1917, p. 26 (Chieng Hai, N. Siam).

1 ♀, Chiengmai, N. Siam (*H. G. D.*); 1 ♂, Paknampo, C. Siam (*C. J. A.*); 1 ♂, Nong Khor, near Sriracha, S. E. Siam (*C. J. A.*); 1 ♂, Pak Jong, E. Siam (*C. J. A.*).

In colour all these specimens are greyer and with the pattern less distinct than in *P. h. hermaphroditus* which, in the Malay Peninsula, can be considered as ranging from Perak southwards. The specimen from Sriracha is the largest example in a good series of the species before me, and as that from Pak Jong has the two posterior pairs of teeth not fully erupted, it must also be considered a large animal. I therefore refer all the specimens listed above to *laotum* described from N. Siam for, although they are like the earlier

described *ravus* of Peninsular Siam in colour, this last-named form seems not to differ from the more southern *P. h. hermaphroditus* in size. The exact boundaries between *ravus* and *laotum* will be difficult to establish.

In the following table the measurements of the two largest available skulls of each sex of *P. hermaphroditus* from the Malay States are given together with the specimens from Siam. Considering that only one example is aged the Siamese series averages large It also includes the largest specimen of all.

[The above was written before Mr. R. I. Pocock's review of this species was published in Proc. Zool. Soc. 1934.]

Paradoxurus hermaphroditus.

Locality	Sex	SKULL				Remarks
		Greatest length	Condylo-basal length	Upper teeth excluding incisors (alveoli)	Zygomatic breadth	
P. h. hermaphroditus						
Perak	♂	118.5	115.4	42.2	59.5	aged
Pahang	♂	117.6	113.2	40.6	71.6	„
Perak	♀	114.1	112.2	41.3	63	„
„	♀	113.7	109.5	38	67.2	„
P. h. laotum						
Chiengmai, N. Siam	♀	108	104.9	38.3	61.2	young adult
Paknampo, C. Siam	♂	114.5	112	41.8	61.2	adult
Pak Jong, E. Siam	♂	115.5	112	—	60.3	dentition incomplete
Sriracha, S. E. Siam	♂	121.5	119.5	43.3	70.9	aged

Arctogalidia trivirgata leucotis (Horsf.).

1 ♂, Doi Sutep, N. Siam, 4,000 feet (*R. d. S.*).

An aged animal. Skull,—greatest length, 105.8; condylo-basal length, 105; zygomatic breadth, 60.4 mm.

Mungos javanicus peninsulae Schwarz.

1 ♀, Chiengmai, N. Siam (*H. G. D.*).

Skull.—greatest length, 80.6; zygomatic breadth, 41.3 mm.

I have been unable to compare this specimen with *exilis* of Annam, but it is very like specimens from the Malay Peninsula.

Mungos siamensis Kloss.

Mungos siamensis Kloss, Journ. Nat. Hist. Soc. Siam, 2, 1917, p. 95 (Muang Prae, N. Siam).

1 ♀, Pak Jong, E. Siam (*C. J. A.*).

A rufous skin agreeing closely with the cotypes of *Mungos siamensis* which is, I suppose, a form of *birmanicus* Thomas.

Greatest length of skull, 71 mm.; zygomatic breadth, 33.7 mm.

Martes flavigula flavigula (Bodd.).

1 ♀, Pak Jong, E. Siam (*C. J. A.*).

Skull (adult).—greatest length (condylo-incisive), 85; zygomatic breadth, 48 mm.

An example of this species from Lat Bua Kao, not far from Pak Jong, has been identified as *M. f. indochinensis* Kloss, described from Klong Menao in S. E. Siam, but there seems some doubt as to whether this form is really separable from *flavigula*. Recent authors refer animals from Annam to *F. f. flavigula*, which occurs in North and West Siam.

Helictis personata laotum (Thos.).

Melogale personata laotum Thomas, Ann. Mag. Nat. Hist. (9), 9, 1922, p. 194 (Nan, N. Siam).

2 ex., Chiengmai, N. Siam (*H. G. D.*); 1 ♀, Chantabun, S. E. Siam (*C. J. A.*).

All the Siamese *Helictis* must for the present be referred to this race which ranges into Annam. The Chantabun specimen seems not to be the larger, but imperfectly known, *H. pierrei* Bonhote, of

Cambodia and Cochin China, the skull of the male type of which measured 88 mm. in its greatest length.

The three skins are much alike in colour.

Skulls.—greatest length, 77.4, 79, 80.5 mm.; greatest diameter of carnassial, 9.2, 9.6, 9.4 mm.; greatest diameter of molar, 7.9, 7.9, 8.0 mm. The measurements of the female are given last.

Lutra tarayensis Hodgs.

1 ♂, 1 ♀, Nakon Sritamarat, Peninsular Siam (*C. J. A.*).

The skulls of these fully adult examples of the smooth otter measure.—

Male.—Condylo-basal length, 127.2; palatal length, 62.3; upper tooth-row, crowns, excluding incisors, 44.2; zygomatic breadth, 79.1 mm.

Female.—Condylo-basal length, 115.5; palatal length, 55.7; upper tooth row, 40.1; zygomatic breadth, 77.5 mm.

Other specimens of this otter in the Raffles Museum are from Pulau Rumbia in the Straits of Malacca off the Selangor coast, and from the mouth of the Chumporn River. (*M. A. S., July 1919*).

Tragulus kanchil affinis Gray.

1 ♂, 1 ♀, Pak Jong, E. Siam (*C. J. A.*).

Adult male.—Skull.—basal length, 82.5 mm.; probable greatest length, about 95.5 mm. Hind-foot (c. u.) dry, about 114 mm,

Adult female.—Skull.—basal length, 81.6 mm.; greatest length, 95.8 mm. Hind-foot, 116 mm.

Tragulus javanicus napu (Cuv.)

Tragulus canescens Miller, Proc. Biol. Soc. Wash., 13, 1900, p. 185 (Trang, Peninsular Siam).

1 ♂, 1 ♀, Bandon, Peninsular Siam (*C. J. A.*).

There are few definite records of the larger mouse-deer from any part of Siam and the above specimens seem to be the most northerly on record from the kingdom although as the species occurs as far north as Bankasoon in S. Tenasserim it can, of course, be expected to occur in South-west Siam. These northern animals seem inseparable from typical *napu* of Sumatra.

Petaurista petaurista lylei Bonh.

Petaurista lylei Bonhote, P. Z. S., 1900, p. 192, pl. xviii (Doi Sutep, N. Siam).

1 ♀, Doi Sutep, N. Siam, 4600 feet (*C. J. A.*); 1 ♀, Doi Angka, N. Siam, 5000 feet (*C. J. A.*).

Some specimens from other parts of North and from West Siam [1] have the base of the fur on the upper surface much more ferruginous, and the upper parts generally brighter, than the animals listed above which are topotypical of *lylei.*

The brighter animals are really intermediate between *lylei* and *barroni*, but on account of their dark tails nearer to the former subspecies. *Barroni* was described from near Sriracha in S. E. Siam and is now known to extend through Monthon Pitsanulok, Central Siam, to a point about five miles east of Raheng.

On description, *P. venningi* Thos., is even darker than *lylei*, but in the original description it may have been compared with animals from N. Siam similar to those mentioned above and not with true *lylei* from Doi Sutep.

I follow Gyldenstolpe in regarding the large flying-squirrels of Siam and French Indo-China as subspecies of the Javan *P. petaurista.* It is true that Thomas and Osgood have recognized two species as occurring in French Indo-China, under the names of *P. lylei badiatus* and *P. annamensis*, the latter author remarking that they occur in the same region, but although the geographic ranges approximate I cannot make out that they overlap. *Badiatus* described from Tonkin is recorded from as far south as Dalat in S. Annam, driving a wedge into the range of *annamensis* only known from Kontoum down to Nha-Trang on the coast in Annam, and Cochin-China.

Petaurista petaurista barroni Kloss.

Petaurista annamensis barroni Kloss, Journ. Nat. Hist. Soc. Siam, 2, 1916, p. 33 (Sriracha, S. E. Siam).

3 ♂, 3 ♀, Pak Jong, E. Siam (*C. J. A.*).

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[1] A point 90 miles N. of Muang Pre, N. Siam; Me Taqua and Sikortur, N. W. of Raheng, W. Siam; and Pa Meang, Me Nga, N. N. E. of Lakon Lampang, N. Siam.

A new locality for this pale form which with its whitish proectote and only black-tipped tail is very distinct from its neighbours, *lylei* and *annamensis*.

Hylopetes alboniger (Hodgson).

1 ♀, Korat, E. Siam, December, 1918 (*M. A. S.*).

This specimen, skinned from alcohol, is now exactly like some examples of *H. phayrei laotum* Thos. in colour but it is much larger.

External measurements in the flesh.—head and body, 200 mm.; tail, 183 mm.; hind-foot (s. u.), 39 mm.; ears, 28 and 27 mm.

Skull.—greatest length, 46.1 (+) mm.; zygomatic breadth, 28.9 mm.

Described from Nepal the species extends to the Chin Hills, Tonkin and Annam. Hitherto, there seems to have been no formal record of an individual from Siam.

Hylopetes phayrei laotum (Thos.).

Sciuropterus phayrei laotum Thomas, Journ. Bomb. Nat. Hist. Soc., xxiii, 1914, p. 28 (Laos Mts.).

2 ♂, 2 ♀, 1 ex., Doi Angka, N. Siam, 4200–5000 feet (*H. G. D.* and *C. J. A.*).

All showing the large size characteristic of this race, the skulls running up to 43.2 mm. in greatest length, and 27.2 mm. in zygomatic breadth. Hind-feet entirely brown, or brown with whitish toes.

Hylopetes belone (Thos.)

Sciuropterus (*Hylopetes*) *belone* Thomas, Ann. Mag. Nat. Hist. (8), 2, 1908, p. 305 (Terutau Island, Straits of Malacca).

2 ex., Bangnara, Peninsular Siam (*C. J. A.*).

This flying-squirrel has been recorded from South Tenasserim and there are specimens in the Raffles Musum from Negri Sembilan, one of the Federated Malay States.

Hylopetes spadiceus (Blyth), also occurs in the Malay States.

Ratufa gigantea stigmosa Thos.

Ratufa gigantea stigmosa Thomas, Journ. Bomb. Nat. Hist. Soc., xxix, 1923, p. 86 ("Doi Sritepe, Chiengmai, Siam").

2 ♀, Doi Sutep, N. Siam. (*R. d. S.* and *C. J. A.*); 1 ♀, Doi Angka, N. Siam, 4,700 feet (*H. G. D.*).

All with tufted ears, no forearm patch, but a yellow patch on the hallucal side of the metatarsus, in the latter character differing from typical *R. gigantea* of Assam.

Ratufa bicolor leucogenys Kloss.

1 ♀, Chantabun, S. E. Siam (*C. J. A.*); 1 ♀, Nong Khor, near Sriracha, S. E. Siam (*C. J. A.*).

Both showing the characteristic pale colour of the yellow areas, and patched metatarsus of topotypical *leucogenys*. They are also small,—greatest length of skulls, 71.2 mm. (Chantabun), and 72.5 mm. (Sriracha).

Sciurus caniceps caniceps Gray.

5 ♂, Pak Jong, E. Siam (*C. J. A.*).

All in bright winter pelage and dated 3 February.

Sciurus erythraeus zimmeensis (Rob. & Wr.).

Callosciurus atrodorsalis zimmeensis Robinson and Wroughton, Journ. Fed. Mal. States Mus., vii, 1916, p. 91 (Chiengmai, N. Siam).

2 ♀, near Chiengmai, N. Siam; 9th March, 4th April (*H.G.D.*); 2 ♂, 2 ♀, Doi Sutep, N. Siam, up to 4000 feet; March, July and December (*R. d. S.* and *C. J. A.*).

The specimens from near Chiengmai are exact topotypes of *zimmeensis* and agree with the description of that form in having the dorsal patch almost obsolete, but in one skin there is no encroachment of the dorsal colouring on the under surface. In two of the Doi Sutep animals there is not the slightest trace of a black patch on the back although they are in fresh pelage. It seems very probable that similar individuals represent the "*S. castaneoventris gordoni*" from N. Siam of Bonhote and Gyldenstolpe. The under parts vary in colour from buff tinged with red in the axillary and inguinal regions to deep reddish chestnut. Vibrissae black.

Sciurus erythraeus thai Kl.

Sciurus atrodorsalis thai Kloss, Journ. Nat. Hist. Soc. Siam, 11, 1917, p. 285 (Raheng, C. Siam).

8 exs., Doi Angka, N. Siam, up to 4900 feet (*H. G. D.* and *C. J. A.*).

Four specimens dated 7th-30th April are in fresh pelage with large black dorsal patches and inseparable from some topotypes of *thai*. The other four skins are in worn pelage and like *zimmeensis*: they are dated 1st-13th March and 27th April. Both phases are found at 4400 feet. Typically, *C. a. thai* is as yet only known from specimens collected from May to July.[1]

In 1916 Kloss described a squirrel from S. W. Siam as *S. erythraeus pranis*, but he afterwards considered that his new race was a form of *S. atrodorsalis*. I suggest that the question of the specific name is not of great significance for I believe that all the subspecies of *erythraeus* and *atrodorsalis* can be lumped as geographical races of one very widely spread species for which the prior name is *erythraeus*. Only the races in the centre of the range develop the black dorsal patch and it can be noted that *shanicus*, the northernmost of the races definitely referred by its describer to *S. atrodorsalis*, was described as practically without the black patch on the back. In *zimmeensis* the patch is "almost obsolete" and as shewn above it is sometimes not present in *thai*. *Pranis*, normally immaculate, occasionally has a slightly blackened area. In the southernmost races, *rubeculus* and *youngi*, there is never a dorsal patch Most significant of all, Osgood has shewn that in the Tonkin *erythraeus* squirrels there is sometimes a tendency to a blackish dorsal stripe. Elsewhere in this paper I have expressed the opinion that *S. atrodorsalis tachin* Kl., is really *S. ferrugineus tachin*, very closely allied to, but separable from, *S. f. siamensis* from Bangkok,

Sciurus ferrugineus siamensis Gray.

I have now seen about one hundred of these squirrels from Bangkok and its immediate environs, taken in all months of the year except October and December. The largest monthly series were collected in March and October. Juveniles are dated 13th March—29th August.

The majority of the specimens examined are in worn pelage or in the change, patches of new hairs showing here and there through the old coat.

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[1] Specimen No. 2646, vide Kloss, Journ. Nat. Hist. Soc. Siam, 3, 1918, p. 59 was collected in *May* not *February*.

Regarding the series as a whole the range of variation in colour is greater than one expects in one form from such a limited range. This variation is individual and not correlated with sex, age, or definite seasonal variation in the species.

This individual variation can, of course, be appreciated best by comparing animals in fresh, unworn pelage, but it can already be noted in worn skins in which only patches of the new pelage are avilable for examination. Furthermore, very young and half-grown animals vary in colour almost, but not quite, as much as the adults: in this case the variation is chiefly in the tail. The variation in adults in good condition is not difficult to express. The under parts range from orange-buff to deep maroon-chestnut: sometimes there are grizzled areas on the throat and middle line.

In colour, the upper parts are the usual grizzled mixture common to many species of medium-sized squirrels, but the general tone varies from greyish olive to reddish brown. In skins of the colder colour the tail is sometimes almost uniform with the upper parts: in examples of the warmest colour the distal half of the tail is deep, dark red. Selected animals will link the two extremes by small gradations and form a series in which at one end there is a grey squirrel with orange-buff under parts, and at the other a reddish brown animal with the under parts much more deeply coloured and with the tail largely dark red. A common intermediate form is one in which the upper parts are a mixture of olive and black without brownish suffusion and the tail largely rufous-buff.

Squirrels representing the extremes of the series can be taken in the same month.

The range of variation exhibited by a large series of this subspecies is further extended by animals in worn or bleached pelage which are usually paler and often rather different from the unworn adult. A common manifestation of "bleaching" is whitening at the base of the tail, on which, owing to its bright colour, old and new pelage are more readily distinguishable than on other parts of the body.

In individuals of the warmer type of colour there is even a slight "burning" or reddening of the pigment in the early stages of wear. In very worn skins there are dull black patches on the back where the surface of the fur is entirely worn away. As in the variation in colour this cycle of pelage seems also purely individual which is rather more surprising but animals in very worn and new coats can be taken together in most months of the year.

Various names (*bocourti, leucogaster, leucocephalus, floweri*), have been applied to pied examples of *S. f. siamensis*, and the recently described *Sciurus cockerelli*[1] seems to present a parallel aberration of a more northern subspecies, *S. f. menamicus* Thos. It is extremely doubtful whether these white-bellied animals represent anything more than a not infrequent aberration or "sport" of an unstable species not even representing a phase at some time passed through by all individuals.

"*S. atrodorsalis tachin*" Kloss, from west of Bangkok is very near to *siamensis* but it is smaller. The original series of *tachin* which is before me is very uniform in colour and the skins could only be confused with the very greyest example of *siamensis*: none is even slightly brown and there is never any red in the tail.

Sciurus ferrugineus frandseni Kloss.

Sciurus ferrugineus frandseni Kloss, Proc. Zool. Soc., 1916, p. 46 (Koh Chang, S. E. Siam).

1 ♂, Khao Sebap, S. E. Siam (*M. A. S.*); 3 ♂, Chantabun, S. E. Siam (*C. J. A.*).

This is a most instructive series for these skins from the mainland cannot be separated from topotypes of *S. ferrugineus frandseni* from Koh Chang in the Gulf of Siam: they also certainly represent Gray's "*Sciurus splendens*", Var. 4 in P. Z. S., 1861, p. 137 which may very well have come from the mountain Khao Sebap, near Chantabun, at the foot of which Mouhot is known to have resided. At Lem Ngop, on the mainland opposite Koh Chang, occur animals like the Cambodian *S. f. cinnamomeus*, but very slightly grizzled on the thighs.

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[1] *Sciurus cockerelli* Thomas, Ann. Mag. Nat. Hist. (10) 2, 1926, p. 100 (near Nan, N. Siam).

Following the coast round to the west the next races are, *S. f. herberti* Rob. & Kl., described from Hup Bon near Sriracha, S. E. Siam; and then *S. f. siamensis* Gray, which is common near Bangkok.

Sciurus nox Wrought.

1 ♀, Chantabun, S. E. Siam (*C. J. A.*).

This skin has the original label attached: it seems to have been obtained by a native collector, but the locality is quite clearly written in Aagaard's handwriting and there seems no reason to doubt its provenance although both *Sciurus ferrugineus frandseni* Kl., and a white form of *S. finlaysoni* (the latter on Wroughton's authority) are recorded from Chantabun.

Tamiops macclellandi kongensis Bonh.

2 ♂, Doi Angka, N. Siam, 3000-4500 feet (*H. G. D.* and *C. J. A.*); 6 ♂, 3 ♀, Doi Sutep, N. Siam, up to 4000 feet (*R. d. S.* and *C. J. A.*).

Of these specimens those dated from December to March are in dull, "cold" pelage. One collected on 6th May is "warmer" in tone.

Menetes berdmorei consularis Thos.

This dull form occurs on Doi Angka and Doi Sutep up to 4200 feet (*H. G. D.* and *C. J. A.*).

Menetes berdmorei koratensis Gyld.

8 ex., Pak Jong, E. Siam (*C. J. A.*).

These fresh skins are from quite near the type locality of *M. b. koratensis* which is Sakerat, south of Korat.

The largest skull measures.—greatest length, 50 mm., zygomatic breadth, 28.1 mm., greatest length of a nasal, 15 mm., lacrymal notch to tip of nasals, 21.2 mm. The hind-feet, measured in the dry skin without further preparation, run up to 42 mm. in length. The colour pattern is extremely variable. One specimen agrees with the original description of *koratensis*: others have a fairly clear, dark, dorsal stripe, and the area between the pale lateral stripes almost black. It therefore seems clear that *koratensis*

cannot be maintained by the points on which it was originally characterized, but on the other hand it seems to me that, on series, specimens of *M. berdmorei* from East and South-east Siam are generally paler than others from Saigon in Cochin China, and as a skin from Kompong Som near Sré Umbel in S. W. Cambodia, agrees best with the latter, I retain *koratensis* for the present.

Dremomys rufigenis adamsoni Thos.

Dremomys rufigensis adamsoni Thomas, Journ. Nat. Hist. Soc. Bombay, xxiii, 1914, p. 25 ("Maymyo, Upper Burma").

3 ♂. 2 ♀, Doi Sutep, N. Siam, 4600-5000 feet; March, December (*R. d. S.* and *C. J. A.*); 2 ♂, 1 ♀, Doi Angka, N. Siam, 4400-5200 feet; April, May (*H. G. D.*).

As this race has been recorded from the South Shan States its occurrence on the mountains of North Siam was to be expected.

Bandicota mordax Thos.

Bandicota mordax Thomas, Journ. Bomb. Nat. Hist. Soc., xxiv, 1916, p. 642 (Chiengmai, N. Siam).

? *Bandicota siamensis* Kloss, Journ. Nat. Hist. Soc. Siam, 3, 1919, p. 238 (Tachin, C. Siam).

1 ♀, Bangkok (*C. J. A.*).

This specimen agrees with both species of the *nemorivaga* group described from Siam in that, compared with true *nemorivaga*, it is darker and has more and longer blackish bristles on the back.

B. mordax, apparently only known from one subadult female, is stated to differ from *nemorivaga* in its larger teeth, but neither in this nor in any other essential character of the skull, does the animal listed above differ from *nemorivaga*.

B. siamensis is described as like *mordax*, but with the skull broader, the nasals longer, the tooth-row shorter and m^1 narrower. In its dental characters *siamensis* is therefore like *nemorivaga* and the Bangkok animal listed above agrees. Turning to the other mentioned cranial characters the Bangkok example has the nasals as in *mordax* and the zygomatic breadth intermediate between that of *mordax* and *siamensis*.

But the type of *mordax* is a subadult female, that of *siamensis* an adult male, while the present animal is an adult, though not aged female, with worn teeth. All the comparisons are therefore not necessarily apt. It seems that constant, cranial distinctions for the Siamese representative of *nemorivaga* have yet to be pointed out although the form seems good and even very distinct on the character of the pelage.

Hind-foot (dry).—about 51.3 mm., but obviously longer than this in the flesh.

Skull.—greatest length, 58.5; condylo-basilar length, 53.8; palatilar length, 31; nasals, 21 x 7; zygomatic breadth, 31.1; upper tooth-row (alveoli), 10.5 mm.

Bandicota savilei curtata Thos.

Bandicota savilei curtata Thomas, Ann. Mag. Nat. Hist. (10), 3, 1929, p. 205; Chasen and Kloss, Journ. Siam Soc., Nat. Hist. Suppl., viii, 1930, p. 75.

3 ♀ subad., Pak Jong, E. Siam (*C. J. A.*).

A new locality for this bandicoot-rat hitherto only known from Raheng, W. Siam.

Rattus blythi Kloss

3 ♂, Doi Angka, N. Siam, 5,000 feet (*C. J. A.*).

Rattus nitidus rahengis Kloss

Rattus griseiventer rahengis Kloss, Journ. Nat. Hist. Soc. Siam, 3, 1918, p. 75 (Me Taw, 40 miles N. W. of Raheng, W. Siam).

Rattus rahengsis, Chasen and Kloss, Journ. Siam Soc., Nat. Hist. Suppl., viii, 1930, p. 74 (near Raheng).

1 ♂, Doi Angka, N. Siam, 4,900 feet (*H. G. D.*).

As in the other forms of *Rattus nitidus*, the few skulls of *R. rahengis* available for study have the nasal length exceeding 40 per cent of the condylo-basal length. Although comparatively soft the fur in *rahengis* is slightly spinous.

On description *Rattus nitidus obsoletus* Hinton, (Journ. Bomb. Nat. Hist. Soc., xxvi, 1919, p. 415) from the Chin Hills, west of Kindat, seems very near to *rahengis* and is possibly the same subspecies.